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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/620,018	07/15/2003	Daniel C. Merkel	H0004175	8618

7590 02/13/2006

Colleen D. Szuch, Esquire  
Honeywell International, Inc.  
101 Columbia Road  
P.O. Box 2245  
Morristown, NJ 07962-2245

EXAMINER
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NGUYEN, NGOC YEN M

ART UNIT	PAPER NUMBER
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1754

DATE MAILED: 02/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/620,018	<b>Applicant(s)</b> MERKEL ET AL.	
	<b>Examiner</b> Ngoc-Yen M. Nguyen	<b>Art Unit</b> 1754	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 November 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,4-8 and 10-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4-8 and 10-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4, 7-8, 10-11, 15-20, 22 are rejected under 35 U.S.C. 102(b) as being anticipated by GB 1,052,118.

GB '118 discloses a process for separating hydrogen fluoride in the production of fluorine-containing halogenated hydrocarbon, the method comprising contacting the gaseous mixture with aqueous sulfuric acid of at least 70% concentration to selectively absorb the hydrogen fluoride (note claim 1). The lower limit of 70% is well within the claimed range.

GB '118 also discloses that the boiling point of the fluorinated product is close to that of hydrogen fluoride (note page 1, lines 36-41). This fairly teaches that the hydrogen fluoride and the fluorine-containing halogenated hydrocarbon is an azeotrope or azeotropic-like mixture.

In the example, a gaseous mixture generated in the production of monochlorodifluoromethane from chloroform and hydrogen fluoride was the starting mixture (note page 2, lines 61-63).

For claims 15-20, since the process of GB '118 has all the positive process limitation as required in the instant claims, the hydrogen fluoride product of the GB '118

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would inherently have the same low amount of sulfur and TOC impurities as the product of the claimed process.

The process of GB '118 anticipates the claimed product.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 4-8, 10-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB '118.

GB '118 discloses a process as stated in the above rejection.

For other value other than "70%" for the sulfuric acid concentration, the range of "at least 70%" as disclosed in GB '118 overlaps the claimed ranges. With respect to the encompassing and overlapping ranges previously discussed, the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time of invention to select the portion of the prior art's range which is within the range of the applicants' claims because it has been held prima facie case of obviousness to select a value in a known range by optimization for the results. *In re Boesch*, 205 USPQ 215. Additionally, the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time invention was made to have selected the overlapping portion of the range

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disclosed by the reference because overlapping ranges have been held to be a prima facie case of obviousness. *In re Malagari*, 182 USPQ 549.

Beside the monochlorodifluoromethane as disclosed in the example, GB '118 discloses generically that process can be used to separate HF from "halogenated hydrocarbon" (note claim 1). Thus, it would have been obvious to one of ordinary skill in the art to use the process of GB '118 to separate other halogenated hydrocarbon, other than monochlorodifluoromethane from HF.

GB '118 further teaches that the HF, which is absorbed in the sulfuric acid, is separated and recycled (note page 2, lines 77-81). Without a showing of criticality or unexpected results, it would have been obvious to one skilled in the art to use any known method in the art, such as flash distillation or fractional distillation, to separate the HF from the sulfuric acid in order to recycle both.

Claims 1, 4-8, 10-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belter (5,874,658) in view of Swain (5,895,639) and GB '118, optionally further in view of Tung '706.

Belter '658 discloses a method of separating a mixture of at least one hydrofluorocarbon and hydrogen fluoride comprising treating said mixture with a compound selected from the group consisting of an alkanolamine and sulfuric acid (note column 1, lines 20-55). Sulfuric acid, i.e. 100% (1.8035 specific gravity) or aqueous solutions of sulfuric acid, i.e. <100% H<sub>2</sub>SO<sub>4</sub> (specific gravity from about 1.830 to about 1.0051) or aqueous solutions of sulfuric acid admixed with at least one alkali metal

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sulfate can be used (note column 1, lines 50-55). The concentration for the sulfuric acid with a specific gravity of 1.830 is approximately 94 %, this value is considered within the claimed value of "less than about 93 wt.%". It should be noted that one skilled in the art would consider the value of "about 93%" to be  $93\% \pm 5\%$ , i.e., less than 88.35% to less than 97.65%.

The hydrofluorocarbon in Belter '658 can be 1,1,1,3,3-pentafluoropropane (hfc-245fa)(note column 3, lines 1-3).

For other values for the concentration of the sulfuric acid, the range disclosed in Belter '658 overlaps the claimed rang, see *In re Boesch*, 205 USPQ 215 and *In re Malagari*, 182 USPQ 549.

Beside the hfc-245fa as disclosed in the examples, Belter '658 discloses generically that process can be used to separate HF from "hydrofluorocarbon" (note claim 1). Thus, it would have been obvious to one of ordinary skill in the art to use the process of Belter '658 to separate other hydrofluorocarbon, other than hfc-245a, from HF.

The difference not yet discussed is Belter '658 does not disclose that the mixture is an azeotrope or azeotrope like mixture, the step of separating HF from sulfuric acid and the presence of a chlorine-containing compound.

Swain '639 discloses a process for separation of hydrogen fluoride from fluorocarbon/HF mixture by sulfuric acid (note claim 1). Swain '639 also teaches that the mixture can be an azeotrope (note column 2, lines 37-38). Swain further discloses

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that HF is separated from the sulfuric acid by distillation (note column 4, lines 13-14).

The separated HF and sulfuric acid can be recycled (note column 3, lines 23-27).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to separate the HF from the sulfuric acid in the process of Belter '658, as suggested by Swain '639 because by doing so the HF and sulfuric acid can be recycled. Since the HF acid used in Belter '658 is anhydrous hydrogen fluoride (note column 3, lines 2-3), it would also have been obvious to one skilled in the art to optimize the distillation process to obtain anhydrous HF. The Examiner takes Official notice that flash distilling and the step of distilling a diluted HF to obtain anhydrous hydrogen fluoride are known and conventional steps in the art.

GB '118 is applied as stated in the above rejection to teach that the sulfuric acid can be used to separate a chlorine-containing compound from HF and the concentration of the sulfuric acid is desired to be at least 70% because when the concentration is lower than 70%, the sulfuric acid tends to dissolve more hydrogen chloride, bromide and iodide and becomes inadequate for fulfilling the object of GB '118 (note page 2, lines 15-25).

It would have been obvious to one of ordinary skill in the art to use the process of the Belter '658 to separate HF from a chlorine-containing compound because such process is desirable as suggested by GB '118 and to use a sulfuric acid with a concentration of greater than 70% for the process of Belter '658 as suggested by GB '118 because lower concentration would not be adequate for the removal of HF.



Optionally, Tung '706 can be applied to teach that the mixture which is subjected to HF recovering, such as the one used in Belter '658 does contain a chlorine containing compound.

Tung '706 discloses a process for producing 1,1,1,3,3 pentafluoropropane (i.e., HFC 245 fa) by reacting pentachloropropane with hydrogen fluoride in the presence of a fluorination catalyst (note claim 1). Tung '706 discloses that the product stream contains HFC-245 fa, HF, HCl, and organic by-products including 1,3,3,3 tetrafluoropropene, 1-chlorotetrafluoropropene. The HCl was removed from the product stream, and the HCl free product is then fed to a sulfuric acid absorber to extract excess HF and to recycle HF back to the reactor (note column 4, lines 53-61). Thus, Tung '706 fairly teaches that the mixture which is subjected to HF recovering step would contain not only fluorine-containing compound but also chlorine-containing compound.

It would have been obvious to one of ordinary skill in the art to use the process of Belter '658 for recovering HF from a mixture containing both F- and Cl-containing compounds, as suggested by Tung '706 because such mixture is desired to be separated in order to recover and recycle the HF.

Applicant's arguments filed November 23, 2005 have been fully considered but they are not persuasive.

Applicants argue that Belter's disclosure is directed to a method of separating HF from HFC's, whereas the present invention is directed to a method of producing anhydrous HF.



It should be noted that in Applicants' claims 1 and 7, the claimed process only require the remove of HF from an azeotrope or azeotrope-like mixture comprising hydrogen fluoride and at least one halogenated hydrocarbon by contacting the mixture with a sulfuric acid solution. For the claims requiring the step of recovering HF, Swain '639 is applied as stated above to teach the desire of recover anhydrous HF in order to recycling it.

Applicants argue the criticality of the claimed range of "from about 65 to about 93 weight percent".

Firstly, the article by Ostrovskii, et al. was not attached to Applicants' response. Secondly, as stated in the above rejection, Belter '658 fairly teaches the value of 94% sulfuric acid, and such value is considered within the claimed value of "about 93%".

Applicant's submission of an information disclosure statement under 37 CFR 1.97(c) with the fee set forth in 37 CFR 1.17(p) on November 23, 2005 prompted the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 609.04(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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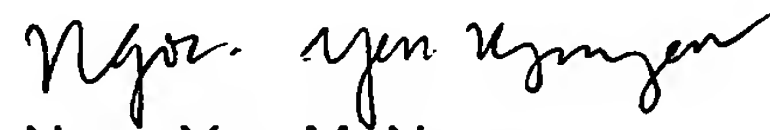
extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoc-Yen M. Nguyen whose telephone number is (571) 272-1356. The examiner is currently on Part time schedule.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Stan Silverman can be reached on (571) 272-1358. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed (571) 272-1700.

  
Ngoc-Yen M. Nguyen  
Primary Examiner  
Art Unit 1754

nmn  
February 6, 2006